

Tortanus scaphus and *Tortanus lophus*, New Pacific Planktonic
Copepods, with Notes on *Tortanus murrayi*
(Calanoida, Tortanidae)¹

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THE CALANOID GENUS *Tortanus* contains 17 known species of predaceous copepods which inhabit coastal waters of the world, except the Antarctic, eastern North Atlantic, and Mediterranean. All except *T. vermiculus* Shen (1955) and *T. denticulatus* Shen & Lee (1963) are listed in Jones and Park (1968). Two schemes have been proposed to subdivide the genus *Tortanus*. Steuer (1926) divided the eight species then known into three groups, without giving names to the groups. Sewell (1932) assigned the seven Indian Ocean species to two subgenera, *Tortanus* and *Atortus*. Sewell's subgenera correspond exactly to two of Steuer's groups, but Sewell made no mention of Steuer's classification, even though he listed Steuer's revision in his bibliography (Sewell, 1929).

Both proposals have been ignored by subsequent workers, who have been content to describe additional species without assigning them to one of Steuer's groups or Sewell's subgenera. Of the eight unassigned species, five (*compennis*, *denticulatus*, *derjugini*, *spinicaudatus*, *vermiculus*) belong to Steuer's first group (*setacaudatus-discaudatus* group), and three (*giesbrechti*, *longipes*, *rubidus*) can be placed in Steuer's third group (*murrayi-brevipes-recticauda*-group) or its equivalent, Sewell's subgenus *Atortus*. The two new species described herein are also members of *Atortus*, bringing the number of species in this subgenus to nine.

GENUS *Tortanus* Giesbrecht

SUBGENUS *Atortus* Sewell

Atortus Sewell, 1932, p. 398, 400. "3. *murrayi-brevipes-recticauda*-Gruppe," Steuer, 1926, p. 51.

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Diagnosis (emended)

Pedigerous segments 4 and 5 fused. Female urosome 2-merous. Prosoma about three times as long as urosome. Caudal rami not elongate. Maxilla 1, proximal lobe with 13 setae. Maxilliped, proximal segment with two long setae. Endopod of 1st leg 2-merous. Second endopod segment of legs 3 and 4 with six setae.

Tortanus (Atortus) scaphus new species
Figs. 1, 2a-b, 3a

Tortanus murrayi A. Scott. Wilson, 1950, pp. 346-347, pl. 18, fig. 235-242.

Material Examined

Makin (= Butaritari) Lagoon, Gilbert Islands, collected by U.S. Fisheries Steamer *Albatross*, no station number: January 6, 1900, two samples of 60 specimens each collected by surface tow (USNM 70659 and 70711); one sample of about 400 specimens collected by surface tow with light (USNM 73539); January 1, 1900, one sample of 75+ specimens (USNM 135023); no date, one sample of 100+ specimens (USNM 67377). Malakal Harbor, Koror, Palau Islands, collected by A. W. Drew: September 26, 1970, five females (USNM 135060); September 28, 1970, 11 females, 12 males (USNM 135061); September 29, 1970, 13 females, four males (USNM 135062). South China Sea, near Hong Kong, lat. 20°37' N, long. 115°43' E, *Albatross* station 5301, August 8, 1908, 20 specimens collected by surface tow (USNM 70607).

Diagnosis

FEMALE: length 2.6-2.8 mm. Ratio of prosoma: urosome 3.2-3.7. Genital segment symmetrical, without processes. Anal segment fused with caudal rami; excavation on left side at level of anal operculum. Left caudal ramus

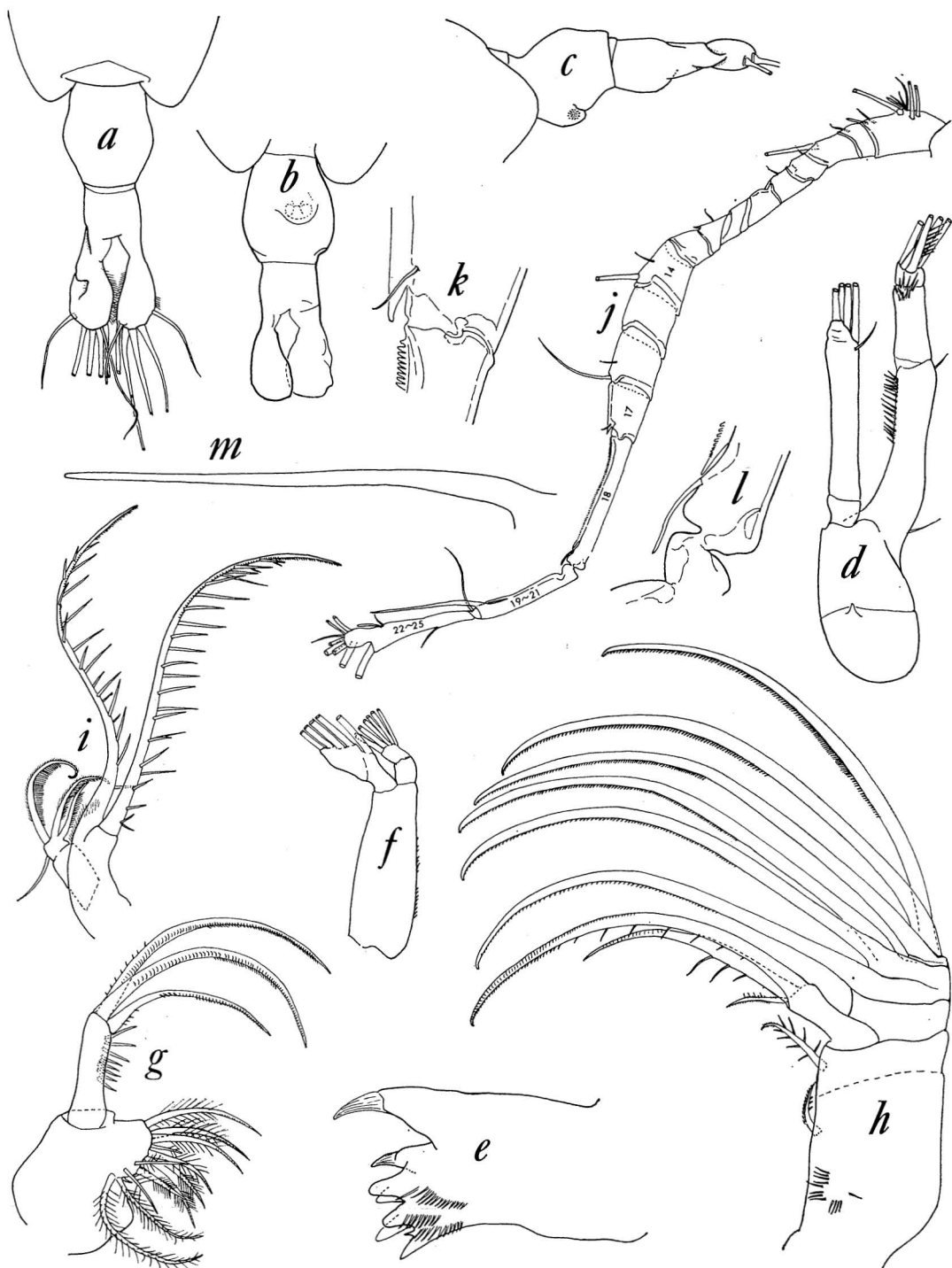


FIG. 1. *Tortanus scaphus*-new species. *a-i*, female: *a*, urosome and posterior prosome, dorsal; *b*, same, ventral; *c*, same, lateral; *d*, antenna 2 (only four of the six apical setae of endopod shown); *e*, gnathal lobe of right mandible, outer surface; *f*, mandibular palp; *g*, maxilla 1, medial; *h*, maxilla 2, medial; *i*, maxilliped, medial. *j-m*, male right antenna: *j*, ventral view, *k*, juncture of segments 17 and 18; *l*, juncture of segments 18 and 19 ~ 21; *m*, spinous process of segment 19 ~ 21.

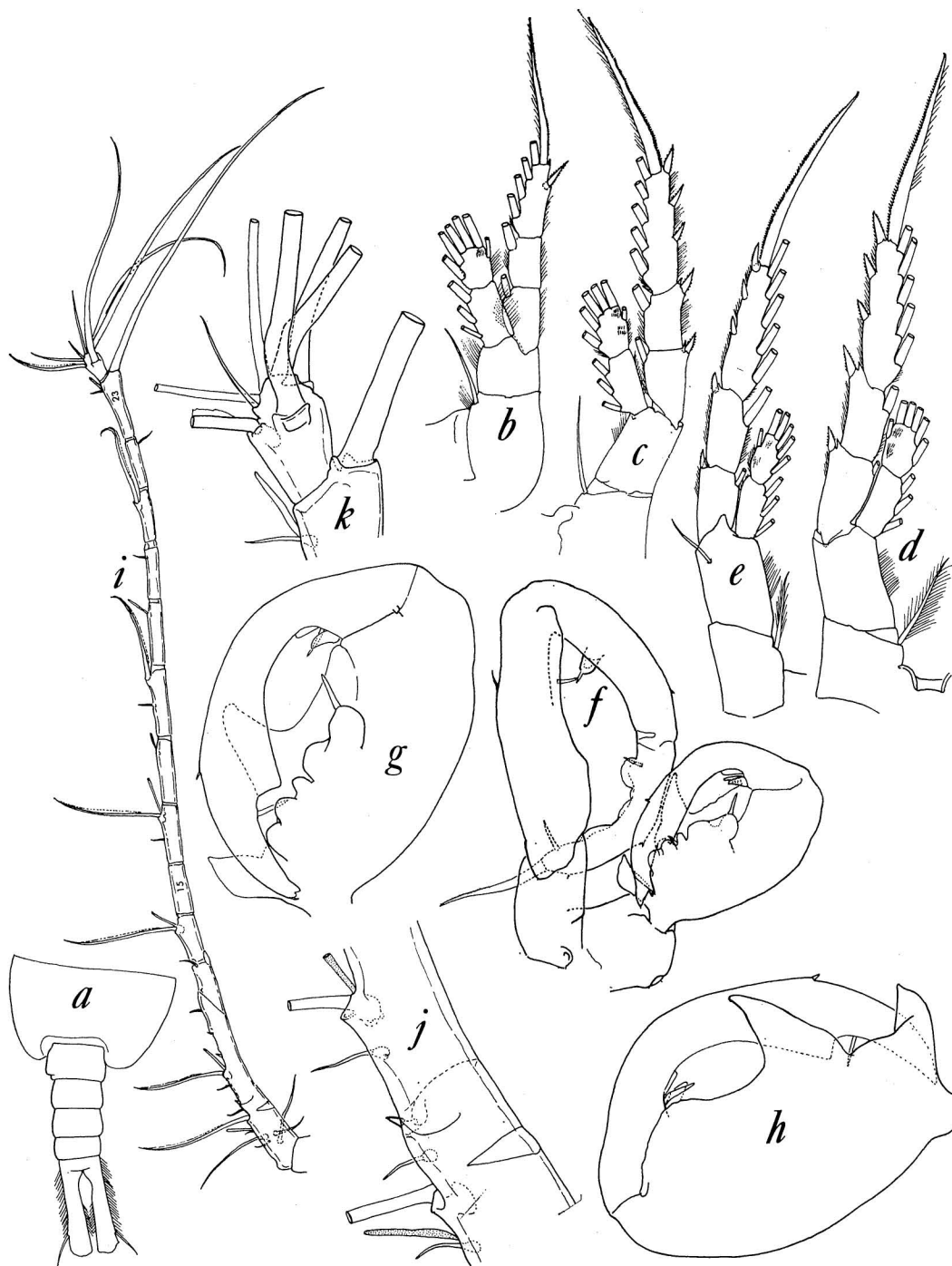


FIG. 2. *a-b*, *Tortanus scaphus* new species. *a*, male urosome and posterior prosome, dorsal; *b*, leg 1, female, anterior; *c*, leg 2, female, anterior; *d*, leg 3, female, anterior; *e*, leg 4, male, posterior; *f*, leg 5, male, anterior; *g*, right leg 5, male, anterior; *h*, same, posterior. *i-k*, *Tortanus lophus* new species, right antenna 1, female: *i*, dorsal view; *j*, segments 8 and 9 ~ 10; *k*, terminal segment.

TABLE 1
ANTENNAL ARMATURE OF *Tortanus scaphus* AND *Tortanus recticauda* FEMALES

SPECIES	SEGMENT										
	13	14	15	16	17	18	19	20	21	22	23
<i>T. scaphus</i>	s	Se	—	Sse	e	Ss	e	s	S	s	Sse
<i>T. recticauda</i>	s	Sse	se	Sse	se	Ss	sse	s	S	s	Sse

NOTE: S, long seta; s, short seta; e, esthete.

slightly wider than right, with broad excavation on left side near midlength.
Antenna 1 reaching slightly beyond caudal rami. Segmentation identical with that of *T. recticauda* according to Giesbrecht (1892); i.e., segments 1~7, 9~12, and 24~25 fused (the symbol ~ indicates fusion), but armature differs (see Table 1).

Antenna 2, mandible, maxilla 1 and 2, and

maxilliped with armature identical to that shown for *T. recticauda* (Giesbrecht, 1892) and for *T. giesbrechti* (Jones and Park, 1968).
Legs 1-4 as in other species of *Atortus*, but with two patches of fine surface hairs on anterior surface of 2nd endopod segment of legs 2-4.
Leg 5 with distal segment ending in three prongs as in *T. murrayi*, but segment more

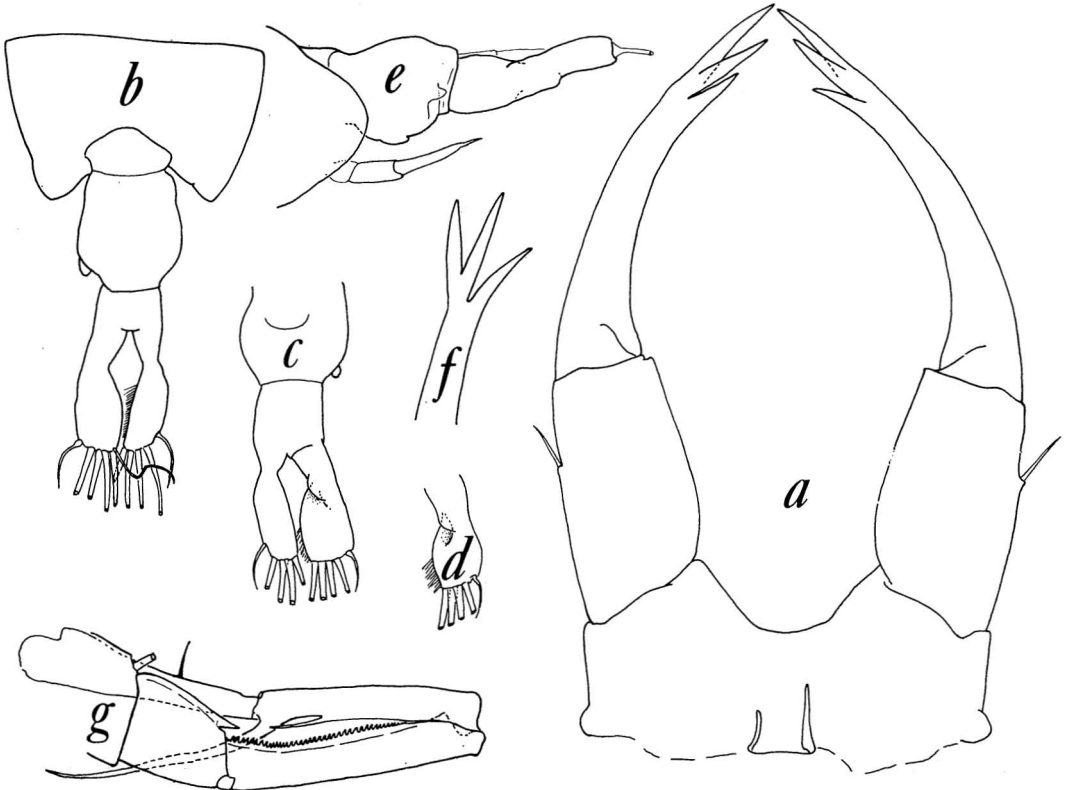


FIG. 3. a, *Tortanus scaphus*, female, leg 5. b-f, *Tortanus murrayi* Scott, female: b, urosome and posterior prosome, dorsal; c, urosome, ventral; d, left caudal ramus, ventral, tilted slightly to the right; e, urosome and posterior prosome, lateral; f, apex of leg 5. g, *Tortanus murrayi*, male, distal segments of right antenna 1, ventral.

strongly curved inward and prongs increasing in length distally.

MALE: length 2.2–2.4 mm. Ratio of prosome: urosome 2.6–3.5. Urosome symmetrical, without processes. Right antenna 1, segments 18 and 22~25 subequal, distinctly longer than segment 19~21; flanges on anterior margins of segment 17 and 19~21 smooth in specimens from Gilbert Islands, partly crenulate in specimens from Palau Islands; distal spinous process of segment 19~21 nearly straight, subparallel to long axis of segment 22~25.

Right leg 5 3-merous, prehensile; 2nd and 3rd endopod segments fused and closing against groove lying between complex anterior and posterior margins of palm of 1st endopod segment. Anterior margin with several rounded lobes; distal lobe largest, armed with subterminal seta, directed distally. Posterior margin with two conspicuous triangular processes, smaller process proximal and larger process at about midlength of margin. Left leg 5 much longer than right, 4-merous. First endopod segment with papilla located at about one-third distance from proximal margin; papilla armed with terminal seta. Segment 2~3 gently curved inward; distal half of outer surface densely setose; inner margin bearing series of rounded lamellae and subterminal spine; apex with long rather robust sinuate spine.

Holotype

Female 2.65 mm, from Makin (= Butaritari) Lagoon, Gilbert Islands, January 1, 1900, surface tow with light, USNM 63736. The other specimens listed under "Material Examined" are paratypes.

The specific name, derived from the Greek σκαφος (= that which is dug or scooped out), refers to the excavations on the anal segment and caudal ramus.

Remarks

Wilson (1950) pointed out that Sars, during his never-completed study of the *Albatross* copepods, recognized specimens of *Tortanus* from Butaritari Lagoon as a new species and prepared pencil drawings of it, some of which Wilson copied and published in his plate 18. Wilson, disagreeing with Sars, identified these

specimens as *Tortanus murrayi* and published a redescription of this species. The illustrations published by Wilson show fewer setae on the mouthparts than I have found, a discrepancy for which I am unable to account. Moreover he stated that "the genital segment has a small tubercle at the left posterior corner," but I have examined numerous specimens without finding such a tubercle.

Wilson (1950) reported the presence of *T. murrayi* at six *Albatross* stations in Philippine waters. None of these specimens are in the collections of the Smithsonian Institution; hence, it is uncertain what species occurred at these stations.

Tortanus (Atortus) lophus new species

Figs. 2i–k, 4

Material Examined

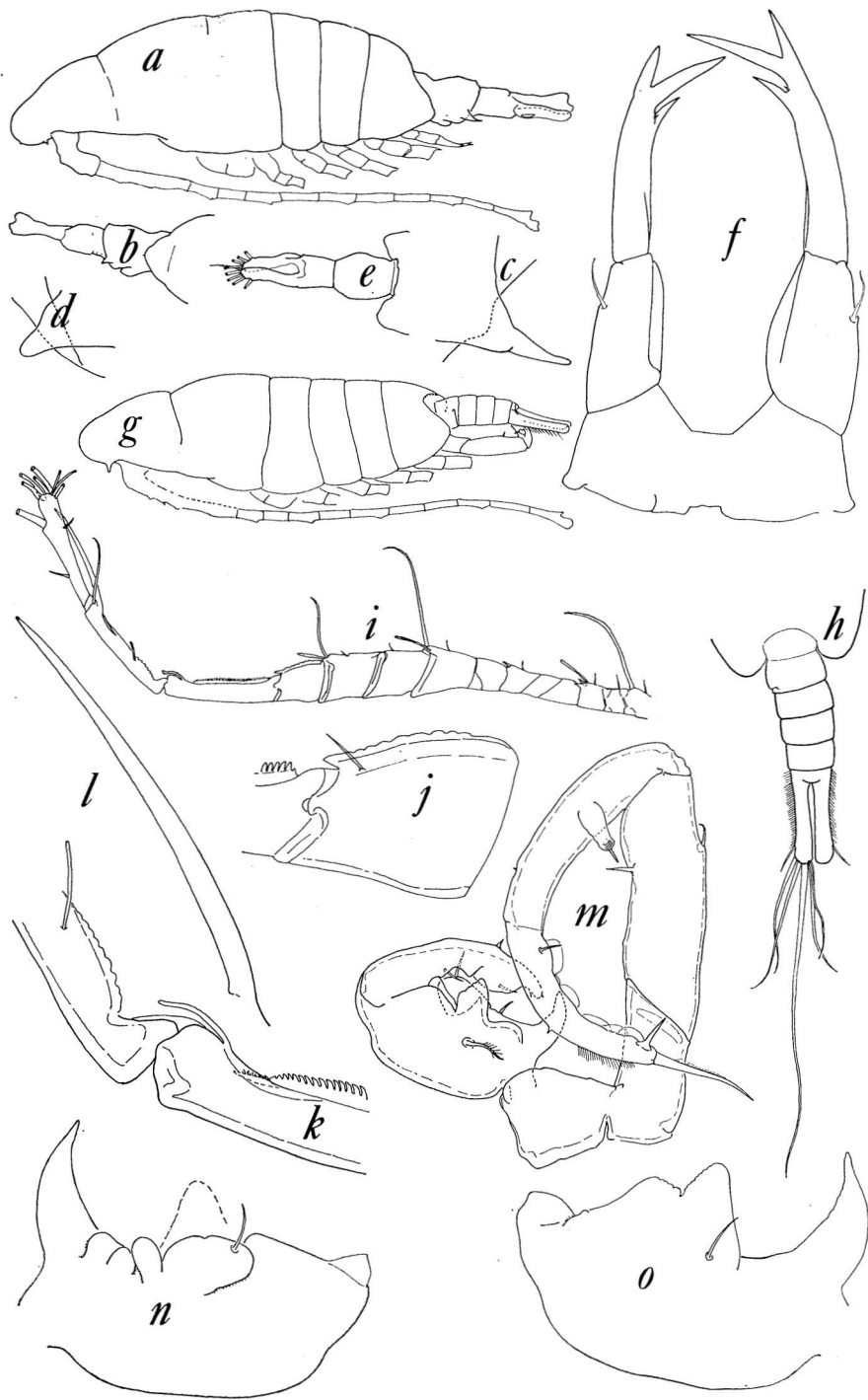
Cove in Kranket Island, Madang Harbor, New Guinea, October 1969, plankton sample collected by Fred Tsuji and Yata Haneda; female holotype (2.45 mm), USNM 135024, and two females, 11 males, six copepodid paratypes, USNM 135025.

Diagnosis

FEMALE: length 2.4–2.5 mm. Ratio of prosome: urosome about 3.3. Genital segment with process on each side near ventral part of posterior margin; process of left side longer and tapering to sharper point than that of right side. Uropods asymmetrical; right uropod slightly wider than left, inner margin raised into nearly vertical ridge.

Antenna 1 reaching caudal rami or slightly beyond. Segmentation and armature identical with that of *T. scaphus*. Mouthparts identical with those of *T. scaphus*. Legs as in *T. scaphus* except 1st endopod segment of legs 2–4 with patch of fine surface hairs on distal half of anterior surface near lateral margin. Leg 5 only slightly curving inward; distal segment ending in three prongs, central prong about twice length of distal prong, proximal prong shorter than distal prong.

MALE: length 2.1–2.2 mm. Ratio of prosome: urosome 2.8–3.8. Urosome symmetrical, with-



out processes. Right antenna 1, segments 18, 19 ~ 21, and 22 ~ 25 subequal; flanges on anterior margins of segments 17 and 19 ~ 21 at least partly crenate; distal spinous process of segment 19 ~ 21 gently curved, apex overlapping segment 22 ~ 25. Leg 5 similar to that of *T. scaphus*, but triangular process on posterior palmar margin of right leg differs; proximal process longer and more tapering than in *T. scaphus*, longer than midlength process, latter shorter and blunter than in *T. scaphus*.

The specific name, from the Greek *λοφος* (= crest), refers to the ridge on the female right uropod.

Tortanus (Atortus) murrayi A. Scott

Fig. 3b-g

Tortanus murrayi A. Scott, 1909, pp. 191-193, pl. 56, fig. 1-8. Steuer, 1926, pp. 65-66, fig. 7 [from Scott]. Rose, 1956, p. 462 [in list]. Not *Tortanus murrayi* A. Scott. Wilson, 1950 [= *T. scaphus*].

Material Examined

Six syntypes, five females, one male without leg 5 and urosome. Scott listed six females and two males from four *Siboga* expedition stations, so one male and one female of the original material appear to have been lost. The type-specimens were kindly loaned to me by Professor J. H. Stock, University of Amsterdam, Zoological Museum, who pointed out that in his *Siboga* report Scott never selected a holotype nor designated a type-locality; furthermore he generally placed all the specimens he considered to be one species into a single vial, even though they sometimes came from several localities. Thus the six syntypes are a mixture from *Siboga* stations 16, 118, 185, and 213. At Professor Stock's request I have selected as the lectotype of *T. murrayi* an adult female, 2.55 mm in length. The remaining three females and one male become paralectotypes.

Diagnosis

FEMALE: length of three specimens with fairly straight bodies, 2.50, 2.55, and 2.64 mm, somewhat shorter than the length given by Scott, 2.65 mm. Ratio of prosome:urosoma 2.8-3.1. Genital segment with short blunt process on left side. Left caudal ramus much broader than right, with excavation on proximomedial part of ventral surface.

Antenna 1 reaching proximal third of caudal ramus; segmentation and armature identical with that of *T. scaphus*. Mouthparts apparently identical with those of *T. scaphus*, but all details could not be seen in undissected specimens. Legs 1-4 as in *T. scaphus*, with two patches of fine surface hairs on anterior surface of 2nd endopod segment of legs 2-4. Leg 5 ending in three prongs; proximal and distal prongs subequal, slightly shorter than central prong.

MALE: length, according to Scott, 2.25 mm. Urosome symmetrical, without processes. Right antenna 1, segment 18 > 22 ~ 25 > 19 ~ 21; flanges on anterior margins of segments 17 and 19 ~ 21 smooth; distal spinous process of segment 19 ~ 21 gently curving. Leg 5 similar to that of *T. scaphus*; proximal process on posterior palmar margin of right leg shorter than midlength process, but latter much blunter than in *T. scaphus*.

RELATIONSHIPS IN THE SUBGENUS *Atortus*

The nine species of *Atortus* can be divided into two groups. The first group, which contains *giesbrechti*, *longipes*, *rubidus*, *tropicus*, and probably *brevipes*, is characterized as follows: male urosomite 2 with process on right side; male right antenna 1, anterior end of serrate margin of segment 18 produced into curved process overriding anterior margin of segment 17, latter produced proximally into spinous process; female leg 5 distal segment either slender and asymmetrical or subquadrate. The second group, containing *recticauda*, *murrayi*,

FIG. 4. *Tortanus lophus* new species. a-f, female: a, lateral view; b, urosome, right side; c, process on left side of genital segment; d, process on right side of genital segment; e, urosome, dorsal; f, leg 5. g-h, male: g, lateral view; h, urosome, dorsal. i-l, male, right antenna: i, ventral view; j, segment 17 and part of segment 18; k, juncture of segments 18 and 19 ~ 21; l, spinous process of segment 19 ~ 21. m-o, male: leg 5, anterior; n, leg 5, 1st endopod segment, anterior; o, same, posterior.

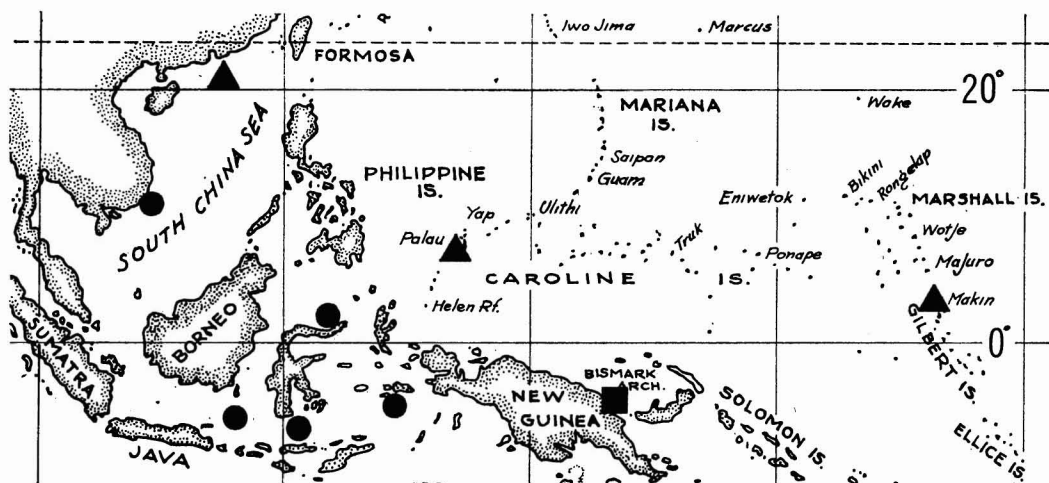


Fig. 5. Locality records: ● *Tortanus murrayi*; ▲ *Tortanus scaphus*; ■ *Tortanus lophus*.

scaphus, and *lophus* may be defined as follows: male urosomite 2 without lateral process; segment 18 of male right antenna 1 not produced; female leg 5 ending in three prongs.

Within the second group there is a distinct morphological gap separating *recticauda* from the other three species. The armature of female antenna 1 is identical in *murrayi*, *scaphus*, and *lophus*, but, as shown in the diagnosis of *T. scaphus*, differs in four segments (14, 15, 17, 19) in *T. recticauda*. The 5th legs of both sexes of *murrayi*, *scaphus*, and *lophus* are much more similar to each other than to those of *recticauda*. The greater morphological divergence of *T. recticauda* is not surprising since its only known locality, Assab, at the southern end of the Red Sea, is quite distant from the ranges of the other three species. The known distributions of the latter are shown in Figure 5.

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